

**TRANSMITTAL LETTER TO THE UNITED STATES  
DESIGNATED/ELECTED OFFICE (DO/EO/US)  
CONCERNING A FILING UNDER 35 U.S.C. 371**

Mo-7021/LeA 33,984

U.S. APPLICATION NO. (If known, see 37 CFR 1.5

To Be Assigned **10/089295**INTERNATIONAL APPLICATION NO.  
PCT/EP00/09091INTERNATIONAL FILING DATE  
18 September 2000 (18.09.00)PRIORITY DATE CLAIMED  
30 September 1999 (30.09.99)TITLE OF INVENTION  
HOLLOW SECTION PROFILE WITH A POLYURETHANE FOAM REINFORCEMENT AND METHOD FOR PRODUCING THE SAME

APPLICANT(S) FOR DO/EO/US ORYWOL, Peter and KREUER, Karl-Dieter

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.
4. ☒ The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
  - a. ☒ is attached hereto (required only if not communicated by the International Bureau).
  - b. ☐ has been communicated by the International Bureau.
  - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
  - a. ☒ is attached hereto.
  - b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).
7. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
  - a. ☐ are attached hereto (required only if not communicated by the International Bureau).
  - b. ☐ have been communicated by the International Bureau.
  - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
  - d. ☐ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371 (c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

**Items 11 to 20 below concern document(s) or information included:**

11. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☒ A **FIRST** preliminary amendment.
14. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
15. ☐ A substitute specification.
16. ☐ A change of power of attorney and/or address letter.
17. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.
18. ☐ A second copy of the published international application under 35 U.S.C. 154(d)(4).
19. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
20. ☒ Other items or information:

Abstract

Drawing (1 sheet)

To Be Assigned

PCT/EP00/09091

ATTORNEY'S DOCKET NUMBER

Mo-7021/LeA 33,984

21. ☒ The following fees are submitted:**BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(5)):**

Neither international preliminary examination fee (37 CFR 1.482)  
nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO  
and International Search Report not prepared by the EPO or JPO ..... **\$1040.00**

International preliminary examination fee (37 CFR 1.482) not paid to  
USPTO but International Search Report prepared by the EPO or JPO ..... **\$890.00**

International preliminary examination fee (37 CFR 1.482) not paid to USPTO  
but international search fee (37 CFR 1.445(a)(2)) paid to USPTO ..... **\$740.00**

International preliminary examination fee (37 CFR 1.482) paid to USPTO  
but all claims did not satisfy provisions of PCT Article 33(1)-(4) ..... **\$710.00**

International preliminary examination fee (37 CFR 1.482) paid to USPTO  
and all claims satisfied provisions of PCT Article 33(1)-(4) ..... **\$100.00**

**ENTER APPROPRIATE BASIC FEE AMOUNT =****CALCULATIONS PTO USE ONLY**

\$ 890.00

Surcharge of **\$130.00** for furnishing the oath or declaration later than ☐ 20 ☐ 30  
months from the earliest claimed priority date (37 CFR 1.492(e)).

\$ 0.00

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	
Total claims	14 - 20 =	0	x \$18.00	\$ 0.00
Independent claims	2 - 3 =	0	x \$84.00	\$ 0.00

**MULTIPLE DEPENDENT CLAIM(S)** (if applicable) + **\$280.00** \$ 0.00

**TOTAL OF ABOVE CALCULATIONS =**

\$ 890.00

☐ Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above  
are reduced by 1/2. + \$ 0.00

**SUBTOTAL =**

\$ 890.00

Processing fee of **\$130.00** for furnishing the English translation later than ☐ 20 ☐ 30  
months from the earliest claimed priority date (37 CFR 1.492(f)).

\$ 0.00

**TOTAL NATIONAL FEE =**

\$ 890.00

Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be  
accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). **\$40.00** per property +

\$ 40.00

**TOTAL FEES ENCLOSED =**

\$ 930.00

Amount to be  
refunded: \$

charged: \$

- a. ☐ A check in the amount of \$ \_\_\_\_\_ to cover the above fees is enclosed.
- b. ☒ Please charge my Deposit Account No. 13-3848 in the amount of \$ 930.00 to cover the above fees.  
A duplicate copy of this sheet is enclosed.
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overpayment to Deposit Account No. 13-3848 A duplicate copy of this sheet is enclosed.
- d. ☐ Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. **Credit card  
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**NOTE:** Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR  
1.137 (a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:



00157

PATENT TRADEMARK OFFICE

SIGNATURE

Lyndanne M. Whalen

NAME

29,457

REGISTRATION NUMBER

10/089295

JC15 Rec'd PCT/PTO 27 MAR 2002

PATENT APPLICATION  
Mo7021  
LeA 33,984

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN APPLICATION OF )  
PETER ORYWOL ET AL ) PCT/EP00/09091  
SERIAL NO.: TO BE ASSIGNED )  
FILED: HEREWITH )  
TITLE: HOLLOW SECTION PROFILE WITH )  
A POLYURETHANE FOAM )  
REINFORCEMENT AND METHOD )  
FOR PRODUCING THE SAME )

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents  
Washington, D.C. 20231

Sir:

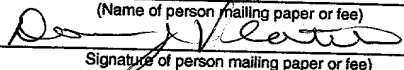
Upon granting the enclosed application a Serial Number and filing date,  
please amend the application as follows:

"Express Mail" mailing label number ET671453195US  
Date of Deposit March 27, 2002

I hereby certify that this paper or fee is being deposited with the United States  
Postal Service "Express Mail Post Office to Addressee" service under 37 CFR  
1.10 on the date indicated above and is addressed to the Assistant Commissioner  
of Patents and Trademarks, Washington, D.C. 20231

Donna J. Veatch

(Name of person mailing paper or fee)

  
Signature of person mailing paper or fee)

IN THE SPECIFICATION:

At page 1, lines 1-2, delete the Title in its entirety and substitute therefor:

--HOLLOW SECTION PROFILE WITH A POLYURETHANE FOAM  
REINFORCEMENT AND METHOD FOR PRODUCING THE SAME--

IN THE CLAIMS:

Please cancel Claims 1-8 and add the following new Claims 9-22:

- 9. A hollow profile produced by
- a) applying a polyurethane foam-forming mixture to a support material insert which is composed of a material that is not permeated by the foam-forming mixture until the support material insert is introduced into the hollow profile with additional polyurethane foam-forming mixture and
  - b) allowing the polyurethane foam-forming mixture to react.
10. The profile of Claim 9 in which the support material insert is a fibrous nonwoven material, a woven textile fabric or a paper having the required delayed foam-forming mixture permeability.
11. The profile of Claim 9 in which the support material insert is a linen or cotton fabric.
12. The profile of Claim 9 in which one or more lateral edges of the support material insert is turned up in the manner of a trough.
13. The profile of Claim 9 in which the polyurethane foam-forming mixture includes an excess of long-chain polyol and/or isocyanate polymer.
14. The profile of Claim 9 in which the polyurethane foam-forming mixture includes an excess of diisocyanate polymer.
15. A process for the production of a foam-filled hollow profile comprising

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- a) applying a liquid polyurethane foam-forming reaction mixture on a support material insert while that insert together with the polyurethane foam-forming reaction mixture is drawn into the hollow profile at a constant speed, the support material insert being composed of a material which is not permeated by the foam-forming mixture until the insert has been introduced into the hollow profile and
  - b) allowing the foam-forming mixture to react so that the foam formed adheres to the hollow profile's interior wall over the profile's entire cross-section.

16. The process of Claim 15 in which the support material insert is composed of a fibrous nonwoven material, a woven textile fabric or paper having the required delayed permeability with respect to the foam-forming mixture.

17. The process of Claim 15 in which the support material insert is a linen or cotton fabric.

18. The process of Claim 15 in which at least one lateral edge of the support material insert is turned up before application of the polyurethane foam-forming mixture.

19. The process of Claim 15 in which the polyurethane foam-forming mixture includes an excess of long chain polyol and/or isocyanate polymer.

20. The process of Claim 15 in which the polyurethane foam-forming mixture includes an excess of diisocyanate polymer.

21. A window profile produced by the process of Claim 15.

22. A ski stick produced by the process of Claim 15.--

IN THE ABSTRACT OF THE DISCLOSURE:

At page 10, lines 1-2, delete the Title in its entirety and substitute therefor:

--HOLLOW SECTION PROFILE WITH A POLYURETHANE FOAM  
REINFORCEMENT AND METHOD FOR PRODUCING THE SAME--

202505050001

**REMARKS**

The title on page 1 of the specification and on the Abstract page have been amended to make the title consistent with that used on the Declaration and Power of Attorney and Assignment papers signed by the inventors. A new Abstract page is enclosed for the Patent Office's convenience.

Claims 1-8 have been cancelled and rewritten as new Claims 9-20.

New Claim 9 corresponds substantially to original Claim 1.

New Claims 10 and 11 correspond substantially to original Claim 2.

New Claim 12 corresponds substantially to original Claim 3.

New Claims 13 and 14 correspond substantially to original Claim 4.

New Claim 15 corresponds substantially to original Claim 5.

New Claims 16 and 17 correspond substantially to original Claim 6.

New Claim 18 corresponds substantially to original Claim 7.

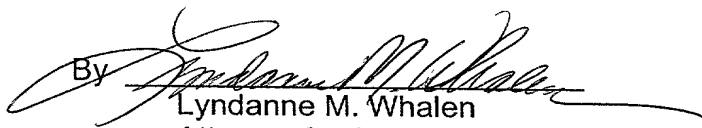
New Claims 19 and 20 correspond substantially to original Claim 8.

New Claim 21 is directed to a window profile produced by the process of Claim 15. Support for this claim is found at page 1, lines 7-8 of the specification.

New Claim 22 is directed to a ski stick produced by the process of Claim 15. Support for this claim is found at page 1, lines 8-9 of the specification.

No new matter is introduced by this Amendment. Entry of this Amendment and an action on the merits are respectfully requested.

Respectfully submitted,

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**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

**IN THE SPECIFICATION:**

At page 1, lines 1-2, delete the Title in its entirety and substitute therefor:

--HOLLOW SECTION PROFILE WITH A POLYURETHANE FOAM  
REINFORCEMENT AND METHOD FOR PRODUCING THE SAME--

**IN THE CLAIMS:**

Claims 1-8 have been cancelled.

Claims 9-22 are new and have been added.

**IN THE ABSTRACT OF THE DISCLOSURE**

At page 10, lines 1-2, the Title has been deleted and the following title has been added.

--HOLLOW SECTION PROFILE WITH A POLYURETHANE FOAM  
REINFORCEMENT AND METHOD FOR PRODUCING THE SAME--

20250526001

HOLLOW SECTION PROFILE WITH A POLYURETHANE FOAM  
REINFORCEMENT AND METHOD FOR PRODUCING THE SAME

ABSTRACT OF THE DISCLOSURE

Hollow profiles (1) with a polyurethane foam filling (2) may be produced in a particularly advantageous manner by applying a liquid reaction mixture (15) onto a support material insert (3) while the support material insert (3) together with the reaction mixture (15) is simultaneously drawn into the hollow profile (1) at a constant speed, wherein a support material insert (3) is used which exhibits delayed permeability to the reaction mixture (15), wherein the period of delay extends from the time of application of the reaction mixture (15) until introduction into the hollow profile (1), and wherein thereafter the support material insert (3) becomes permeable to the reaction mixture (15) and, as it forms, the foam (2) adheres well to the internal wall (4) of the hollow profile (1) over the entire cross-section of the profile.

20220526001

(12) NACH DEM VERTRAG ÜBER DIE INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES  
PATENTWESENS (PCT) VERÖFFENTLICHTE INTERNATIONALE ANMELDUNG

(19) Weltorganisation für geistiges Eigentum  
Internationales Büro



(43) Internationales Veröffentlichungsdatum  
5. April 2001 (05.04.2001)

PCT

(10) Internationale Veröffentlichungsnummer  
WO 01/23162 A1

(51) Internationale Patentklassifikation<sup>7</sup>: B29C 44/38, 44/12

(71) Anmelder (für alle Bestimmungsstaaten mit Ausnahme von US): BAYER AKTIENGESellschaft [DE/DE]; 51368 Leverkusen (DE).

(21) Internationales Aktenzeichen: PCT/EP00/09091

(72) Erfinder; und

(22) Internationales Anmeldedatum:  
18. September 2000 (18.09.2000)

(75) Erfinder/Anmelder (nur für US): ORYWOL, Peter [DE/DE]; Alter Bahndamm 9, 53797 Lohmar (DE). KREUER, Karl-Dieter [DE/DE]; Bohnenkampsweg 18, 51371 Leverkusen (DE).

(25) Einreichungssprache: Deutsch

(74) Gemeinsamer Vertreter: BAYER AKTIENGESellschaft; 51368 Leverkusen (DE).

(26) Veröffentlichungssprache: Deutsch

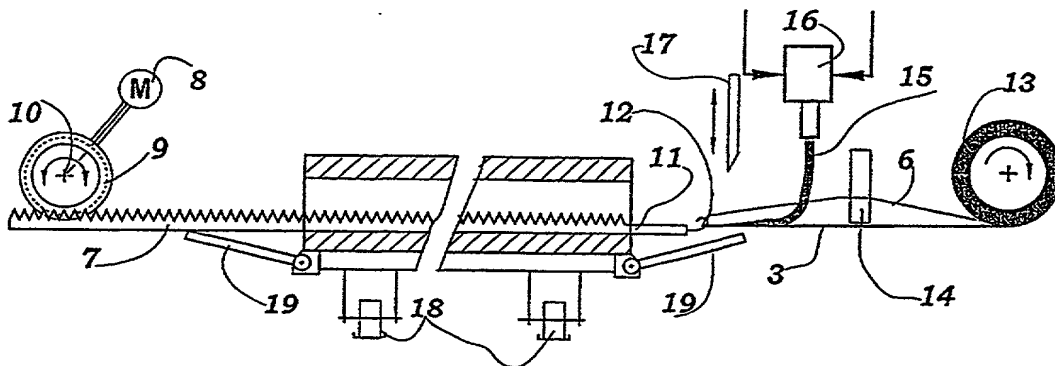
(30) Angaben zur Priorität:  
199 46 854.0 30. September 1999 (30.09.1999) DE  
199 50 604.3 21. Oktober 1999 (21.10.1999) DE

(81) Bestimmungsstaaten (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK,

[Fortsetzung auf der nächsten Seite]

(54) Title: HOLLOW SECTION PROFILE WITH A POLYURETHANE FOAM REINFORCEMENT AND METHOD FOR PRODUCING THE SAME

(54) Bezeichnung: HOHLKAMMERPROFIL MIT EINER POLYURETHAN-AUSSCHÄUMUNG UND VERFAHREN



(57) Abstract: The invention relates to hollow section profiles (1) with a polyurethane foam reinforcement (2). Said profiles are especially produced by applying a liquid reaction mixture (15) on a support material insert (3) while said support material insert (3), together with the reaction mixture (15), is drawn into the hollow section profile (1) at a constant speed. The support material insert (3) used has a retarded permeability for the reaction mixture (15), the retardation period lasting from the time of application of the reaction mixture (15) to the insertion of the hollow section profile (1), and the support material insert (3) then turning permeable to the reaction mixture (15). The foamed material (2) produced is characterized by an excellent adherence to the inner walls (4) of the hollow section profile (1) across the entire profile cross-section.

(57) Zusammenfassung: Hohlkammerprofile (1) mit einer Polyurethan-Ausschäumung (2) lassen sich besonders vorteilhaft herstellen, indem ein flüssiges Reaktionsgemisch (15) auf eine Trägermaterialeinlage (3) aufgetragen wird während die Trägermaterialeinlage (3) samt Reaktionsgemisch (15) in das Hohlkammerprofil (1) mit gleichmässiger Geschwindigkeit eingezogen wird, wobei eine Trägermaterialeinlage (3) verwendet wird, welche für das Reaktionsgemisch (15) eine verzögerte Durchlässigkeit aufweist, wobei das Verzögerungsintervall vom Zeitpunkt der Aufgabe des Reaktionsgemisches (15) bis zum Einbringen in das Hohlkammerprofil (1) dauert und wobei danach die Trägermaterialeinlage (3) für das Reaktionsgemisch (15) durchlässig wird und der sich bildende Schaumstoff (2) überall über den Profilquerschnitt eine gute Haftung mit der Innenwandung (4) des Hohlkammerprofils (1) eingeht.

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**Hollow profile with a polyurethane foam filling and process for the production of a hollow profile filled with a polyurethane foam**

5 This invention relates to a hollow profile with a polyurethane foam filling and to a process for the production of a hollow profile filled with a polyurethane foam.

10 Hollow profiles, for example window profiles, are provided with a foam filling for thermal insulation purposes or plain tubes, for example for ski sticks, are filled with foam for reinforcement purposes. Twin-walled tubes with foam thermal insulation arranged between the walls are also already known. In this case, the reaction mixture is introduced either by means of a mixing head drawn through the gap between the tubes or the mixture is applied onto a strip of paper outside the tube and said strip is continuously drawn into the cavity which is to be filled with foam (Kunststoff Handbuch, volume 7, "Polyurethane", 3<sup>rd</sup> edition, Carl Hanser Verlag, Munich-Vienna, page 283; ISBN 3-446-16263-1). It is moreover generally known to introduce reinforcing nonwovens into hollow articles before filling them with foam, said nonwovens being permeated by the reaction mixture, such that a higher density and thus stronger foam is obtained in this area.

20 In the case of narrow hollow profiles, it has proved difficult to introduce a liquid reaction mixture to fill the cavity with foam. In particular, if plastics profiles, for example made from PVC, are used, there is a risk that the profile will be deformed in an unwanted manner by the pressure of the foam.

The object thus arises of providing a hollow profile, the foam filling of which exhibits a uniform density and a low foam pressure over the length of the profile and moreover possesses good adhesion to the internal wall of the hollow profile.

This object is achieved by a support material insert permeated by the polyurethane foam, which insert, in the prior foam-free initial state, in the period of time from application of the liquid reaction mixture onto this support material insert until the introduction of this support material insert together with the reaction mixture into

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Donna J. Veatch

(Name of person mailing paper or fee)

the hollow profile, exhibits impermeability to this reaction mixture and which, after introduction into the hollow profile prior to the incipient increase in viscosity of the rising foam, is permeable to this reaction mixture.

5 In this manner, it is ensured that the support material insert acting as support strip which may be drawn into the cavity together with the reaction mixture prevents, by virtue of its permeability delayed by the stated period of time, the support material insert from being permeated by the reaction mixture before the introduction thereof into the hollow profile. It is thus also impossible for the reaction mixture to be  
10 scraped off in contaminating manner at the profile inlet. On the other hand, the existing permeability which is, however, delayed for the stated period of time, ensures that, once introduced into the cavity, this reaction mixture is capable of permeating the support material insert during, or even before, foaming and thus, on curing, also achieves good adhesion with the internal wall of the cavity on the far  
15 side of the insert. It is immaterial here whether the support material insert floats somewhat or becomes a little distorted because all that is important in foam filling is proper introduction of the reaction mixture and, optionally, thermal insulation, as the support insert has no reinforcing function.

20 It is indeed known from the cited "Kunststoff Handbuch", volume 7, page 283 that when foam filling tubes, "the paper strip must be drawn in completely when the foaming reaction starts". However, this provides no information as to the permeability of the paper strip and, specifically neither as to the onset of permeability to the liquid reaction mixtures nor whether the paper strip is ever  
25 permeable to the foaming reaction mixture. In contrast to known insert strips, the novel support material insert performs a completely different task. It is also not necessary for the support material insert to be completely drawn into the hollow profile before it becomes permeable. Instead, it is merely necessary for the particular portion of the support material insert bearing the reaction mixture always to be  
30 drawn into the hollow profile before it becomes permeable.

The support material insert preferably consists of a fibrous nonwoven, a woven textile fabric, such as linen or cotton, or a paper with appropriately delayed permeability.

5 Due to the numerous influencing factors, suitable support material inserts are best identified empirically. If it is assumed on the basis of experience that the reaction mixture exhibits a viscosity of 100 to 800 mPa s before or until it is inserted into the cavity, support materials which have proved particularly suitable are those consisting of polyester nonwovens with a basis weight of between 30 and 60 g/m<sup>2</sup> and thicknesses of 0.4 to 0.6 mm. Fibre thickness naturally also has an influence here. Tightly woven fabrics, such as for example bleached and washed cotton fabrics, with basis weights of 200 to 300 g/m<sup>2</sup> are also suitable. Tests have revealed that, under the stated conditions, such support materials are capable of retaining a liquid reaction mixture for approx. 5 to 20 seconds before the mixture starts dripping through. Provided that the correct drawing in speed and correct distance between the mixture application point and the profile inlet are selected, no problems arise.

Another particular embodiment is characterised in that the lateral edges of the support material insert are turned up in the manner of a trough.

20 In the case of tubular hollow profiles having a curved internal cross-section, the support material insert has an appropriate curvature even before it is introduced into the cavity. In the case of a rectangular internal cross-section, the lateral edges are folded up, especially if the profile is narrow. This prevents the reaction mixture from running off over the edges of the support insert before introduction into the cavity. 25 The lateral edges should not be too tall as there is otherwise a risk that, due to its increasing viscosity, the rising foam will no longer be able to permeate the upper part of the lateral edges, consequently meaning that there would be no adhesion between the foam filling and the internal wall of the profile at this point. In the case of profiles with a wide internal cross-section, this risk does not generally arise 30 because the reaction mixture is applied along the middle and cannot flow out laterally as far before introduction. In this case it is unnecessary to turn up the lateral

edges. In the case of narrow rectangular hollow profiles, it is also possible to arrange them for foam filling with their wide, flat internal wall at the bottom so as to avoid turning up the lateral edges. The hollow profile may then optionally have to be rotated by 90° for its final use. It is immaterial that in such cases the support material insert is ultimately disposed vertically.

Once aware of the novel support material insert, the person skilled in the art of polyurethane will have no difficulty in making a selection from the wide range of reaction mixtures suitable for producing the insulating foam filling.

It has, however, proved particularly advantageous for the starting components of the reaction mixture used to produce the foam filling to comprise elevated proportions of long-chain polyols and/or di- and/or isocyanate polymers.

Provided that the correct metering rate is selected for the reaction mixture, selecting such reaction components also advantageously promotes a low foam pressure and foam stability with regard to heat treatment when the profiles are painted. Such painting is generally necessary for aluminium profiles; painting is not necessary for plastics profiles, for example made from PVC, as the plastic may generally itself be coloured the desired colour.

The process for the production of the novel hollow profile takes as its basis a hollow profile filled with polyurethane foam, wherein a liquid reaction mixture is applied onto a support material insert, while the support material insert together with the reaction mixture is simultaneously drawn into the hollow profile at a constant speed.

The novelty of the process is that a support material insert is used which exhibits delayed permeability to the reaction mixture, wherein this period of delay extends from the time of application of the reaction mixture until introduction into the hollow profile, and that thereafter the support material insert becomes permeable to the reaction mixture and, as it forms, the foam adheres to the internal wall of the profile over the entire cross-section of the profile.

The support material is drawn in, for example, using a rod which may be moved to and fro by means of a driven pinion on a rack downstream from the rod. A coilable link chain which exhibits sufficient rigidity at its hinge points, for example by virtue of protruding tabs, when it slides over the bottom internal wall of the profile is also conceivable.

The support material insert drawn in preferably comprises a fibrous nonwoven, a woven textile fabric, such as linen or cotton fabric, or paper.

Particularly advantageously, the lateral edges of the support material insert are turned upwards before application of the reaction mixture.

The starting components of the reaction mixture used to produce the foam filling preferably comprise those having elevated proportions of long-chain polyols and/or di- and/or isocyanate polymers.

The advantages of the process variants have already been described in relation to the structure of the novel hollow profile.

The drawings show a purely schematic diagram of the novel hollow profile and the production thereof in one exemplary embodiment, described in more detail below. In the drawings:

Fig. 1 is a longitudinal section of the hollow profile,

Fig. 2 is a cross-section of the hollow profile and

Fig. 3 is a partially sectional side view of an apparatus for the production of this hollow profile.

In Figs. 1, 2, a substantially rectangular hollow profile 1 consists of a window profile of plastics, specifically made from coloured PVC. For clarity's sake, the hollow profile 1 is shown merely as a simple rectangular profile. A thermally

insulating foam filling 2 of polyurethane foam is arranged within the hollow profile. In the lower part of the filling there is a support material insert 3 of a polyester nonwoven which, in its original state, exhibits a basis weight of 40 g/m<sup>2</sup> and a thickness of 0.5 mm. In accordance with the bottom, flat inner wall 4 and the perpendicular inner side walls 5 of the hollow profile 1, the lateral edges 6 of the support material insert 3 are folded up perpendicularly by approx. 8 mm. The support material insert 3 together with its lateral edges 6 is completely permeated by the foam, such that the foam filling 2 everywhere exhibits good adhesion to the inner wall 4 of the hollow profile 1. The polyurethane reaction mixture used comprised long-chain polyols and/or di- and/or isocyanate polymers.

According to Fig. 3, a rack 7 interacts with a pinion 9 driven by a motor 8. A rigid drawing rod 11 is arranged on the axis 10 of the pinion 9, which rod extends through a hollow profile 1 to be filled with foam, which may be moved away laterally, and the other end of which rod has a clip 12 to grip a support material insert 3 drawn off from a supply reel 13. The lateral edges 6 of the support material insert 3 are turned upwards by means of a folding apparatus 14, specifically before the reaction mixture 15 is applied onto this support material insert 3 by means of a mixing head 16. The driven pinion 9 travels at a constant speed along the rack 7, the speed being adjusted such that the applied reaction mixture 15 only permeates the support material insert 3 once it has been introduced into the hollow profile 1. On the other hand, permeation still proceeds promptly enough for the reaction mixture 15 still to have a viscosity which is sufficiently low for this purpose. Once the support material insert 3 together with the reaction mixture 15 has been introduced into a length of the hollow profile 1, the clip 12 is released and a cutting apparatus 17 arranged at the inlet side of the hollow profile 1 cuts off the support material insert 3. The hollow profile is now moved away laterally by means of a trolley 18 arranged thereunder and sealed at both side with flaps 19. The reaction mixture 15 now foams and cures to yield the foam filling 2, which everywhere exhibits good adhesion to the inner wall 4 of the hollow profile 1. On foaming, the support material insert 3 changes its position, but this is immaterial. Once the foam filling 2 has cured, the flaps 19 are opened and the hollow profile 1 filled with foam is complete and is removed.

Another hollow profile 1 is placed upon the trolley 18, which, together with the hollow profile 1, is returned to the filling position etc..

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**Claims**

1. Hollow profile (1) with a polyurethane foam filling (2), characterised by a support material insert (3) permeated by the polyurethane foam, which insert, in the prior foam-free initial state, in the period of time from application of the liquid reaction mixture (15) onto this support material insert (3) until the introduction of this support material insert (3) together with the reaction mixture (15) into the hollow profile (1), exhibits impermeability to this reaction mixture (15) and which, after introduction into the hollow profile (1) prior to the incipient increase in viscosity of the rising foam, is permeable to this reaction mixture (15).
2. Hollow profile according to claim 1, characterised in that the support material insert (3) consists of a fibrous nonwoven, a woven textile fabric, such as linen or cotton fabric, or a paper with appropriately delayed permeability.
3. Hollow profile according to one of claims 1 or 2, characterised in that the lateral edges (6) of the support material insert (3) are turned up in the manner of a trough.
4. Hollow profile according to one of claims 1, 2 or 3, characterised in that the starting components of the reaction mixture (15) used to produce the foam filling (2) comprise elevated proportions of long-chain polyols and/or di- and/or isocyanate polymers.
5. Process for the production of a hollow profile (1) filled with a polyurethane foam, wherein a liquid reaction mixture (15) is applied onto a support material insert (3), while the support material insert (3) together with the reaction mixture (15) is simultaneously drawn into the hollow profile (1) at a constant speed, characterised in that a support material insert (3) is used which exhibits delayed permeability to the reaction mixture (15), wherein the

period of delay extends from the time of application of the reaction mixture (15) until introduction into the hollow profile (1), and that thereafter the support material insert (3) becomes permeable to the reaction mixture (15) and, as it forms, the foam (2) adheres to the internal wall (4) of the hollow profile (1) over the entire cross-section of the profile.

6. Process according to claim 5, characterised in that the support material insert (3) consists of a fibrous nonwoven, a woven textile fabric, such as linen or cotton fabric, or a paper with appropriately delayed permeability.

7. Process according to claim 5 or 6, characterised in that, before application of the reaction mixture (15), the lateral edges (6) of the support material insert (3) are turned up in the manner of a trough.

8. Process according to claim 5, 6 or 7, characterised in that the starting components of the reaction mixture (15) used to produce the foam filling (2) comprise elevated proportions of long-chain polyols and/or di- and/or isocyanate polymers.

**Hollow profile with a polyurethane foam filling and process for the production of a hollow profile filled with a polyurethane foam**

**A b s t r a c t**

Hollow profiles (1) with a polyurethane foam filling (2) may be produced in a particularly advantageous manner by applying a liquid reaction mixture (15) onto a support material insert (3) while the support material insert (3) together with the reaction mixture (15) is simultaneously drawn into the hollow profile (1) at a constant speed, wherein a support material insert (3) is used which exhibits delayed permeability to the reaction mixture (15), wherein the period of delay extends from the time of application of the reaction mixture (15) until introduction into the hollow profile (1), and wherein thereafter the support material insert (3) becomes permeable to the reaction mixture (15) and, as it forms, the foam (2) adheres well to the internal wall (4) of the hollow profile (1) over the entire cross-section of the profile.

(Fig. 3)

Fig. 1

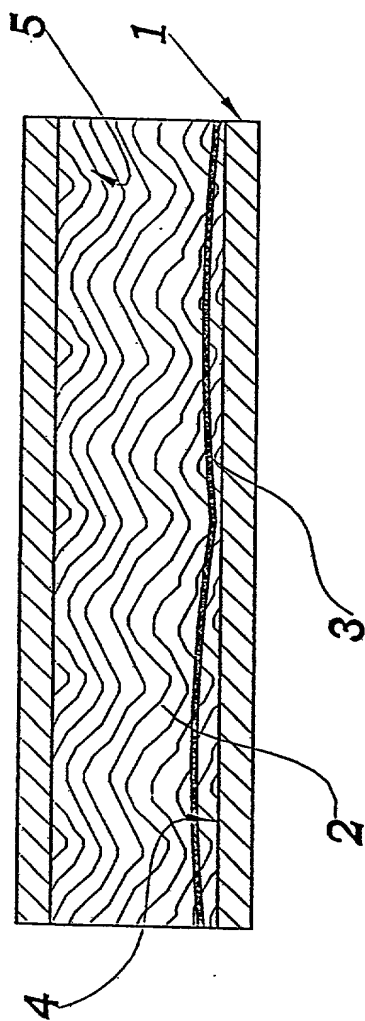


Fig. 2

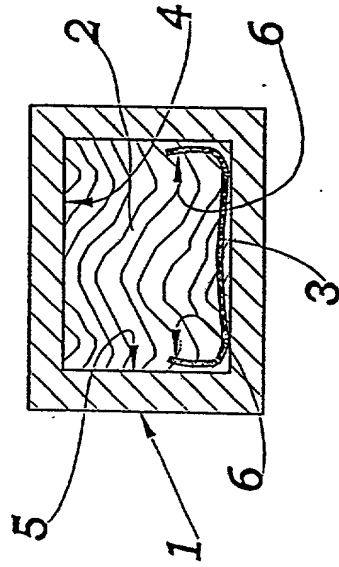
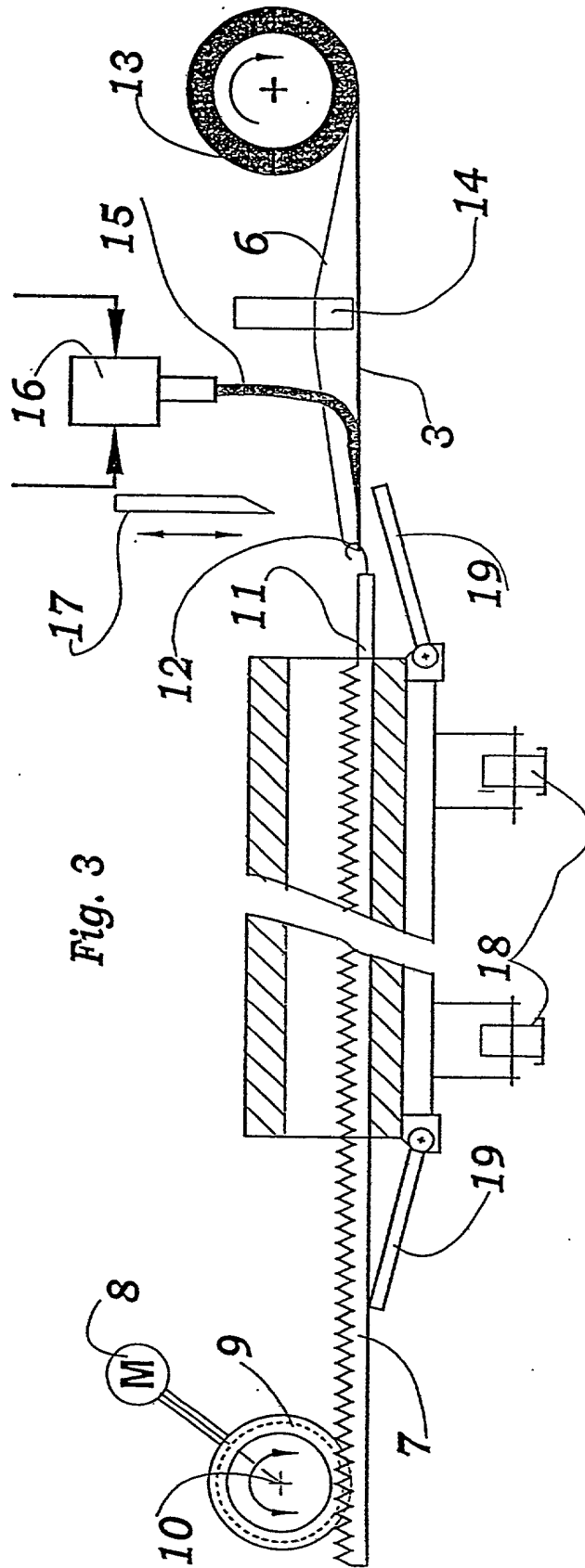


Fig. 3



As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name. I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought

on the invention entitled

**HOLLOW SECTION PROFILE WITH A POLYURETHANE FOAM REINFORCEMENT AND METHOD FOR PRODUCING THE SAME**

the specification of which is attached hereto,

or was filed on **September 18, 2000**

as a PCT Application Serial No. **PCT/EP00/09091**

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, §1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s), the priority(ies) of which is/are to be claimed:

<b>199 46 854.0</b> (Number)	<b>Germany</b> (Country)	<b>September 30, 1999</b> (Month/Day/Year Filed)
<b>199 50 604.3</b> (Number)	<b>Germany</b> (Country)	<b>October 21, 1999</b> (Month/Day/Year Filed)

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose the material information as defined in Title 37, Code of Federal Regulations, §1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Serial No.)	(Filing Date)	(Status) (patented, pending, abandoned)
(Application Serial No.)	(Filing Date)	(Status) (patented, pending, abandoned)

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FULL NAME OF THIRD INVENTOR		INVENTOR'S SIGNATURE	DATE
RESIDENCE		CITIZENSHIP	
POST OFFICE ADDRESS			
FULL NAME OF FOURTH INVENTOR		INVENTOR'S SIGNATURE	DATE
RESIDENCE		CITIZENSHIP	
POST OFFICE ADDRESS			
FULL NAME OF FIFTH INVENTOR		INVENTOR'S SIGNATURE	DATE
RESIDENCE		CITIZENSHIP	
POST OFFICE ADDRESS			
FULL NAME OF SIXTH INVENTOR		INVENTOR'S SIGNATURE	DATE
RESIDENCE		CITIZENSHIP	
POST OFFICE ADDRESS			
FULL NAME OF SEVENTH INVENTOR		INVENTOR'S SIGNATURE	DATE
RESIDENCE		CITIZENSHIP	
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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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